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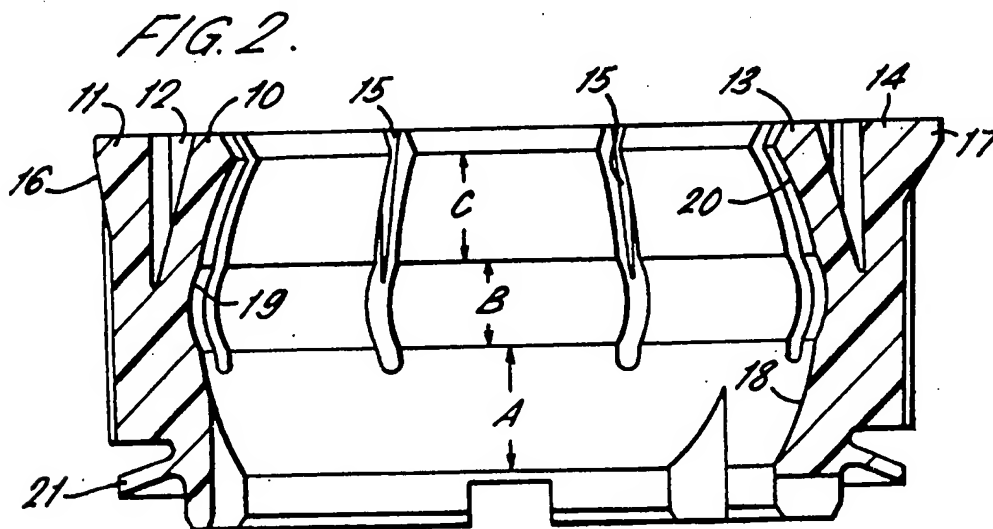
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None

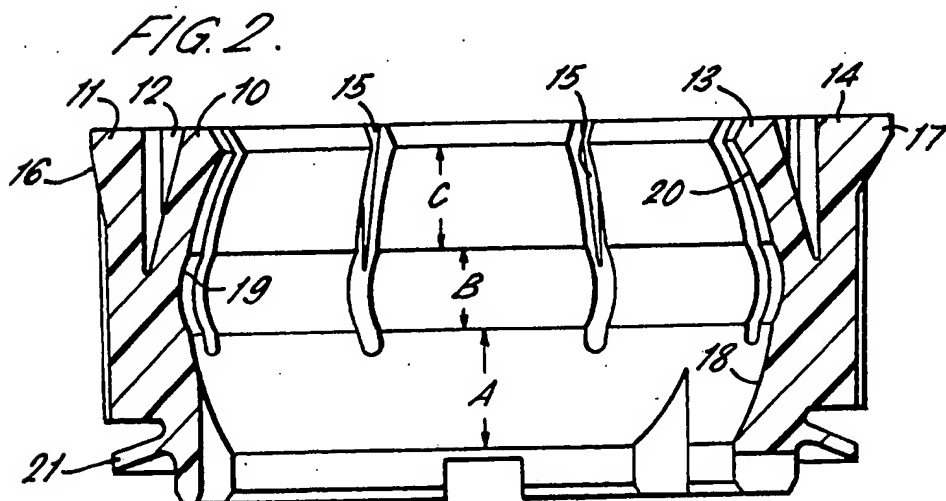
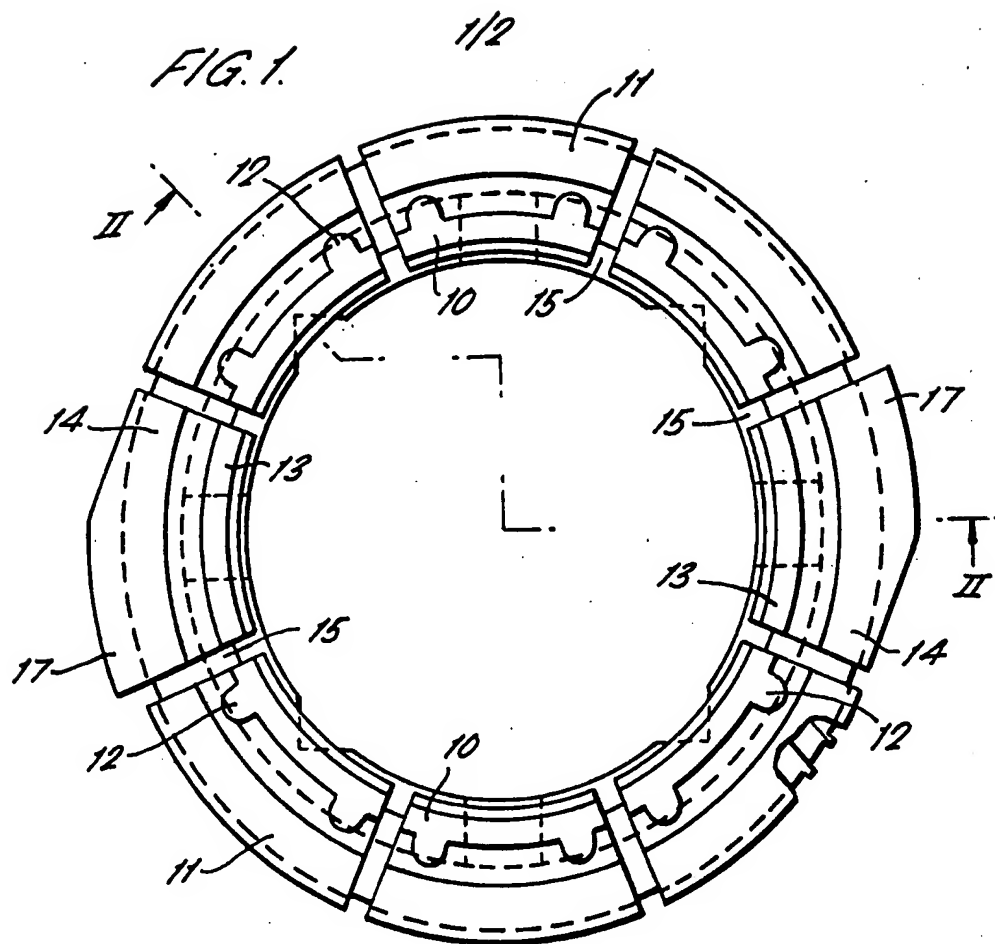
(58) Field of search
E2F

(54) A plain spherical bearing outer ring

(57) A plain spherical bearing outer ring has at one axial end a plurality of axially extending discrete pairs of lips arranged annularly. Each pair of lips comprises an elastically bendable radially inner lip 10, 13 and an elastically bendable radially outer lip 11, 14. One of the opposed surfaces of at least one pair of lips 10, 11 has at least one raised portion 12 which, in the relaxed state of the ring, is spaced from the other opposed surface.



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FIG. 3.

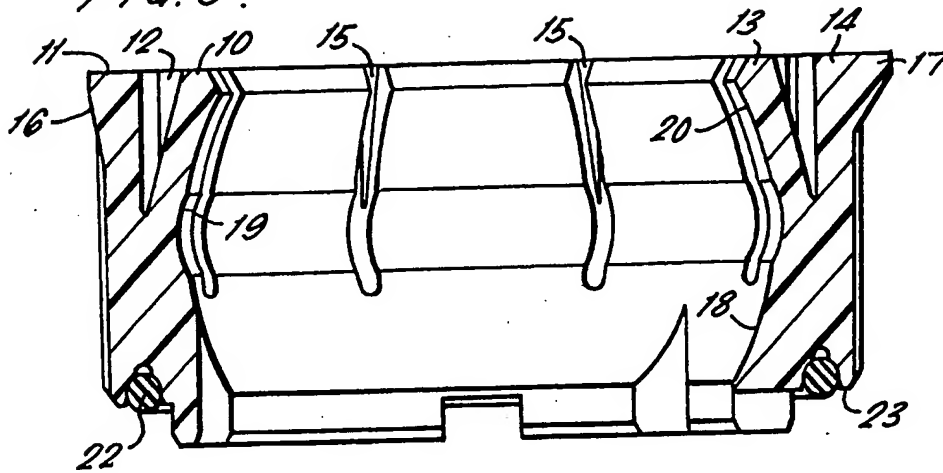


FIG. 4.

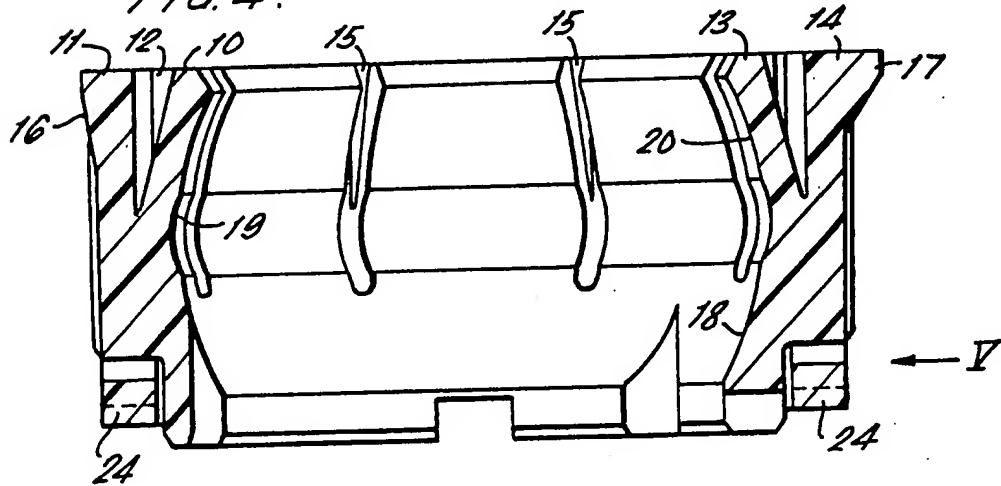
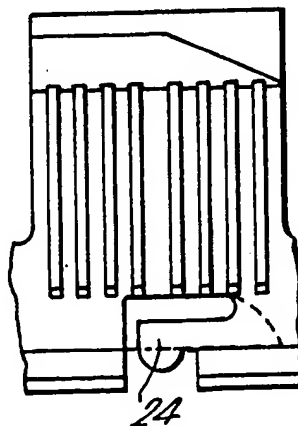


FIG. 5.



SPECIFICATION

A plain spherical bearing outer ring

5 This invention concerns a plain spherical bearing outer ring. In use, the outer ring is mounted in a bore of a housing and an inner ring having a spherical outer surface or a ball is disposed in the bore of the outer ring.

10 Patent Specification DE (AS) 2525836 discloses an outer ring having at one axial end two axially extending annular lips, one disposed radially inside the other. Extending radially from one lip to the other are a plurality of resilient webs. The webs are deformed when the outer ring is mounted in the bore of a housing and they press parts of the outer ring radially inwardly. Thus the bore surface of the outer ring is preloaded against the surface of the inner ring or ball. However as a result of production tolerances, a definite clearance or a definite preloading cannot be obtained between the parts of the bearing.

Specification DE (GM) 1936279 discloses a plain spherical bearing having an outer ring with an annular groove in its bore axially offset to one axial end. This groove forms a radially inwardly extending annular elastically bendable limb. When the inner ring is inserted into the bore of the outer ring, the elastic limb is deformed and positions the two parts without relative play.

In both of these known constructions, the inner ring or ball can be forced out of the bore of the outer ring under high axial loading.

The subject of the invention is a plain spherical bearing outer ring which can allow a definite clearance or definite preloading to be achieved between the parts of the bearing and in an assembled bearing helps to resist to a high degree the forcing out of the inner ring or ball under high axial loading.

The invention provides a plain spherical bearing outer ring having at one axial end a plurality of axially extending discrete pairs of lips arranged annularly, each pair of lips comprising an elastically bendable radially inner lip and an elastically bendable radially outer lip, one of the opposed surfaces of at least one pair of lips having at least one raised portion which, in the relaxed state of the ring, is spaced from the other opposed surface.

When the bearing is assembled, the lips of each pair are brought together and either there is still a gap between the raised portion or portions and the opposed surface (clearance) or the raised portion or portions contact the opposed surface (preload).

With an outer ring according to the invention, an independantly re-adjustable bearing can be devised which, after dismounting from the housing bore, can be readily dismounted.

Means, such as an annular conically inclined elastically bendable projection, an elas-

tically deformable ring, or elastically bendable arms, may be provided at the other axial end of the ring to accommodate axial tolerances and to produce an axially directed preloading of the ring in the housing.

Embodiments of the invention will now be described by way of example and with reference to the accompanying drawings, of which:

75 *Figure 1* is a view along the longitudinal axis of one embodiment of a plain spherical bearing outer ring according to the invention;

Figure 2 is a section on II-II of the ring shown in Fig. 1;

80 *Figure 3* is a section similar to that of Fig. 1 but of another embodiment;

Figure 4 is another section similar to that of Fig. 1 but of a further embodiment; and

85 *Figure 5* is part of a view on Fig. 4 in the direction of arrow V.

Figs. 1 and 2 show a plastics plain spherical outer ring having at one axial end six axially extending discrete pairs of lips arranged annularly. Each pair of these lips comprises an elastically bendable radially inner lip 10 and an elastically bendable radially outer lip 11. On the radially outer surface of each inner lip 10, opposed to the radially inner surface of the outer lip 11, are two raised portions or axially extending ribs 12. In the relaxed state of the ring, as shown in the drawings, the ribs 12 are spaced from the radially inner surface of the outer lip 11.

There are two further pairs of lips, diametrically opposed to each other, each pair also comprising an elastically bendable radially inner lip 13 and an elastically bendable radially outer lip 14. However there are no ribs or other raised portions provided on the opposed surfaces of each pair of these lips which enables the outer lips 14 to yield radially more than the other lips 11.

Each of the pairs of lips 10, 11 and 13, 14 are spaced circumferentially apart from one another by radially continuous slots 15 extending axially from the end face at the one axial end beyond the centre of the bearing, when assembled.

Each of the outer lips 11 has a sloping outer surface 16 so that the lip widens towards its free end. And each of the outer lips 14 has a radially outwardly extending projection 17.

The bore of the ring comprises three annular zones A, B and C. Zone A, at the end opposite to that having the lips 10, 11, 13 and 14 provides a spherical seating surface 18 for the inner ring having the sphered outer surface or the ball (not shown for which the outer ring is intended. Zone B, disposed centrally of the ring, provides an annular recess 19 with a surface not contacted by the inner ring or ball when mounted. Zone C, at the end having the lips 10, 11, 13 and 14, has a spherical surface 20, sub-divided by the slots

15, which, in the relaxed state of the ring as shown in the drawings, has a radius of curvature which is less than that of the sphered outer surface of the inner ring or ball for which the outer ring is intended.

At a short distance from the other end of the ring, that is, the end opposite to that having the lips 10, 11, 13 and 14, there is an elastically bendable radially outwardly extending annular projection 21. This projection 21 is conically inclined and converges with the longitudinal axis of the ring in the direction towards the one end having the lips. The place of convergence is about the centre of the ring surrounded by the annular recess 19 in zone B.

In assembling the bearing, the inner lips 10 and 13 are stressed because of the smaller radius of curvature and load the inner ring or ball against the seating surface 18 in zone A. This predetermined preloading ensures the setting of a definite friction moment and automatic re-adjustability of the bearing.

When installing the bearing in the bore of a housing, the sloping outer surface 16 of the lips 11 causes the lips to be bent radially inwardly so that the ring is disposed in the bore with radial preloading. This, however, does not act or acts only slightly on the inner ring or ball. This deformation of the outer lips 11 brings the ribs 12 of the inner lips 10 almost or into contact with the outer lips 11. This means that the inner lips 10 and outer lips 11 are prevented from any substantial movement radially so preventing, or resisting to a high degree, the removal axially of the inner ring or ball.

Upon insertion of the bearing into the bore of a housing, the annular conically inclined projection 21 is axially loaded against an end abutment in the bore until the radial projections 17 of the two outer lips 14 engage in a recess or groove in the housing bore. The outer ring is thus secured in the housing at a constant axial preloading.

In the second embodiment, illustrated in Fig. 3, instead of the conically inclined annular projection 21, the ring has an elastically deformable O-ring 22 disposed in an annular recess in an end face 23, spaced a short distance from the axial end of the ring. The O-ring 22 protrudes from the end face 23, and is axially compressed when the bearing is inserted into the bore of a housing to also axially preload the outer ring.

In the embodiment illustrated in Figs. 4 and 5, the axial preloading of the outer ring in the bore of a housing is achieved with a plurality of generally circumferentially extending elastically bendable arms 24. When the bearing is inserted in the bore of the housing the arms 24 are bent in the direction towards the axial end of the outer ring having the pairs of lips.

Modifications to the illustrated embodiments are envisaged. For example, instead of

raised portions or ribs 12 on the inner lips 10, they can be provided on the outer lips 11 additionally or alternatively.

70 CLAIMS

1. A plain spherical bearing outer ring having at one axial end a plurality of axially extending discrete pairs of lips arranged annularly, each pair of lips comprising an elastically bendable radially inner lip and an elastically bendable radially outer lip, one of the opposed surfaces of at least one pair of lips having at least one raised portion which, in the relaxed state of the ring, is spaced from the other opposed surface.

2. A ring as claimed in Claim 1, having in its bore at the other axial end a spherical seating surface, at the said one end a spherical surface having, in the relaxed state of the ring, a radius smaller than that of the seating surface, and centrally an annular recess adjoining the two spherical surfaces.

3. A ring as claimed in Claim 1 or 2, wherein the opposed surfaces of each pair of lips of two diametrically opposed pair of lips have no raised portions.

4. A ring as claimed in Claim 1, 2 or 3, having at the said other axial end an annular conically inclined projection which is elastically bendable.

5. A ring as claimed in Claim 4, wherein the projection converges with the longitudinal axis of the ring in a direction towards the said one axial end.

6. A ring as claimed in Claim 1, 2 or 3, wherein an elastically deformable ring is disposed in an annular recess in an end face at the said other axial end and protrudes therefrom.

7. A ring as claimed in Claim 1, 2 or 3, having a plurality of arms at the said other axial end, which arms are elastically bendable in a direction towards the said one end.

8. A plain spherical bearing substantially as herein described with reference to and as shown in the accompanying drawings.

9. A radial ball and socket joint comprising an outer ring or the like and an inner ring or ball head arranged in a spherical bore, in which the outer ring, starting from one end face, is provided with a circular axially directed recess and with projections on the circumference in the vicinity of the recess, characterised in that on the side provided with the circular recess the outer ring has axially directed radially continuous slots which divide up outer tongues and inner elastic tongues, and in that at least one of the radially overlying tongues is provided on the mutually facing surfaces with one or more ribs or the like, in the non-installed condition of the joint the ribs being separated from the other tongues by a clearance which, in the installed conditioned of the joint, is approximately or completely closed.

10. A radial ball and socket joint according to Claim 9, characterised in that the outer ring has in the bore a portion with a circular recess, which portion on the unslotted side of the outer ring is adjoined by a portion with the bearing surface for the inner ring or ball head of the joint and on the other side by a portion having a radius of curvature which, in the non-installed condition of the joint, is smaller than that of the bearing surface of the inner ring.

11. A radial ball and socket joint according to either of Claims 9 or 10, characterised in that two or more diametrically opposite outer tongues have no ribs or the like on the mutually facing surface.

12. A radial ball and socket joint according to any of Claims 9 to 11, characterised in that the outer ring is provided on the unslotted side, at a distance from the end face and starting from the circumferential surface, with a circular channel which forms a portion like a conical spring.

13. A radial ball and socket joint according to Claim 12, characterised in that the outer lateral surface of the portion of conical-spring type is inclined towards the joint centre.

14. A radial ball and socket joint according to any of Claims 9 to 11, characterised in that the other ring in the end face remote from the slots has an annular recess in which an O-ring of elastic material is disposed which, in the non-installed condition of the joint, protrudes beyond the end face of the outer ring.

15. A radial ball and socket joint according to any of Claims 9 to 11, characterised in that resilient tongues or the like are disposed on the end face of the outer ring remote from the slots.